

1 1. Power converter apparatus comprising
2 a transformer having galvanically isolated windings
3 defining a primary side and a secondary side of said power
4 conversion apparatus,
5 a switch for coupling power from a source on the
6 primary side via the transformer to a load on the secondary
7 side,
8 a first circuit assembly having primary-side
9 circuitry galvanically coupled to a port for connection to
10 an input power source, said primary-side circuitry including
11 a primary-side communicator for sending or receiving control
12 information used in controlling operation of the power
13 conversion apparatus,
14 a second circuit assembly having secondary-side
15 circuitry galvanically coupled to a port for connection to a
16 load, said secondary-side circuitry including a secondary-
17 side communicator for sending or receiving said control
18 information,
19 the first and second circuit assemblies being
20 mechanically separable as assemblies from one another,
21 galvanically isolated from one another, and configured to be
22 placed in positions relative to one another to enable said
23 primary-side and secondary-side communicators to cooperate
24 to pass said control information.

1 2. The power converter apparatus of claim 1 wherein
2 said communicators comprise windings and said control
3 information is passed by electromagnetic coupling between
4 them.

1 3. The power converter apparatus of claim 1 further
2 comprising circuitry for passing said information by
3 modulating a carrier.

1 4. The power converter apparatus of claim 2 wherein
2 said coupling is achieved without a permeable core linking
3 said windings.

1 5. The power converter apparatus of claim 2 further
2 comprising a permeable core linking said windings.

1 6. The power converter apparatus of claim 2 wherein
2 said windings are formed on surfaces of separate circuit
3 boards.

1 7. The power converter apparatus of claim 1 wherein
2 said first and second circuit assemblies are enclosed
3 respectively in mechanically separate protective housings.

1 8. The power converter apparatus of claim 7 wherein
2 said protective housing comprises a dielectric encapsulant.

1 9. The power converter apparatus of claim 8 wherein
2 the housings of the two assemblies meet at respective mating
3 surfaces and coupling occurs across the mating surfaces.

1 10. The power converter apparatus of claim 9
2 wherein the coupling is electromagnetic.

1 11. The power converter apparatus of claim 1
2 further comprising a circuit board, power conversion
3 components being mounted on said circuit board, said
4 assemblies also being mounted on said circuit board.

1 12. Power converter apparatus comprising
2 a transformer having galvanically isolated windings
3 defining a primary side and a secondary side of said power
4 converter,
5 a switch for coupling power from a source on the
6 primary side via the transformer to a load on the secondary
7 side,
8 a primary-side circuit assembly galvanically coupled
9 to a port for connection to an input power source, and
10 having a primary-side winding formed on a printed circuit
11 board,
12 a secondary-side circuit assembly galvanically
13 coupled to a port for connection to a load, and having a secondary-
14 side winding formed on a second printed circuit board,
15 the first and second circuit assemblies being
16 separately encapsulated in mechanically separable housings
17 having mating surfaces, the assemblies being galvanically
18 isolated from one another, the housings being configured to
19 be held together with the surfaces mating to enable said primary-
20 side and secondary-side windings to cooperate to pass said
21 control information across the mating surfaces.

1 13. A power converter control circuit apparatus
2 comprising
3 first circuitry encapsulated to form a first
4 discrete physical unit and connected to respond to control
5 information received from second circuitry encapsulated in a
6 second discrete physical unit,
7 the two physical units respectively including
8 subparts of a device for conveying said control information
9 via a galvanically isolated electromagnetic path.

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1 14. A method of providing control circuitry for use
2 in manufacturing individual power converters in a mode in
3 which the individual power converters all conform to a
4 single general design, and different ones of the power
5 converters have different operating characteristics achieved
6 by different components used within the single general
7 design, the method comprising

8 providing supplies of different versions of a first
9 discrete control circuit, said first discrete control
10 circuit including a primary-side communicator for sending or
11 receiving control information used in controlling operation
12 of said power converter,

13 providing supplies of different versions of a second
14 discrete control circuit, said second discrete control
15 circuit including a secondary-side communicator for sending
16 or receiving said control information,

17 said first and second circuit assemblies being of
18 the kind which are mechanically separable from one another,
19 galvanically isolated from one another, and configured to be
20 placed in positions relative to one another to enable said
21 primary-side and secondary-side communicators to cooperate
22 to pass said control information, and

23 for each of the individual power converters being
24 manufactured, selecting different versions of the first and
25 second control circuits to achieve desired operating
26 characteristics in the power converters, and

27 incorporating the selected different versions into
28 each converter in orientations which permit them to
29 communicate control information between them to achieve the
30 desired operating characteristics.

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1 15. A power converter comprising
2 a primary circuit assembly including a primary
3 winding of a power conversion transformer, a switch for
4 influencing the coupling of power from an input port of the
5 primary assembly to the primary winding, and primary side
6 control circuitry for opening and closing the switch,
7 a secondary circuit assembly including a secondary
8 winding of the power conversion transformer, and
9 control circuitry for receiving control information
10 useful in determining when to open and close the switch,
11 the primary and secondary circuit assemblies being
12 encapsulated as distinct components and held in proximity to
13 one another to permit coupling between the primary and
14 secondary windings of the power transformer via a permeable
15 core, and to permit communication of the control information
16 between the secondary circuit assembly and the primary
17 circuit assembly.

1 16. The power converter of claim 15 wherein said
2 control circuitry includes galvanically isolated components
3 respectively in each of said circuit assemblies.

1 17. The power converter of claim 16 wherein said
2 galvanically isolated components comprise windings and said
3 control information is passed by electromagnetic coupling
4 between them.

1 18. The power converter of claim 15 wherein said
2 control circuitry includes elements for passing said control
3 information by modulating a carrier.

1 19. The power converter of claim 17 wherein said
2 coupling is achieved without a permeable core linking said
3 windings.

1 20. The power converter of claim 17 further
2 comprising a permeable core linking said windings.

1 29. The isolation apparatus of claim 25 wherein
2 said electronic modulation comprises amplitude modulation.

1 30. A method for transferring control information
2 between primary-side and secondary-side circuitry in a power
3 converter, said method comprising:

4 modulating a carrier signal with said control
5 information, and

6 coupling said modulated carrier between said
7 primary-side and said secondary-side via galvanically
8 isolated communicators.

1 31. The method of claim 30 further comprising
2 detecting and demodulating said coupled modulated carrier to
3 regenerate said control information.